

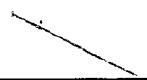
Date: Thursday, 06/11/2008 2:31:39 PM
 User: Julie Dawson

Process Sheet

Customer	CU-DAR001 Dart Helicopters Services			Drawing Name	OUTER FWD SADDLE		
Job Number	43246			Part Number	D5951		
Estimate Number	11076			Drawing Number	D5951 REV.B		
P.O. Number				Project Number	N/A		
This Issue	06/11/2008	S.O. No.	:	Drawing Revision	B		
Prsht Rev.	NC			Material			
First Issue	/ /	Type	MACHINED PARTS	Due Date	27/11/2008		
Previous Run	39793			Qty:	8	Um:	Each
Written By							
Checked & Approved By	<u>JUL 08-11-08</u>						
Comment	Est Rev:E Re-Format 05-11-29 JLM						
	Est Rev:E Re-Format 05-11-29 JLM						

Additional Product

Job Number:

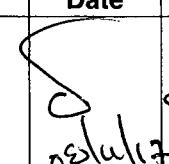
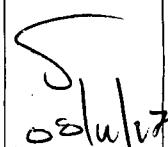


Seq. #:	Machine Or Operation:	Description:	
1.0	D6101013	Saddle Billet	
		Comment: Qty.: 1.0000 Each(s)/Unit Total : 8.0000 Each(s)	
		D6101-013 (7075-T7351)	
		Size 2.50" x 10.10" X 8.25" (Grain along 10.10")	
		Batch: B41963	
2.0	HAAS3	HAAS CNC VERTICAL MACHINING #3	
		Comment: HAAS CNC VERTICAL MACHINING #3	
		1-Machine as per folio D5951, Ensure Batch Number is entered	
		2-Machine Keyway	
		3-Deburr & Tumble	
3.0	QC1	INSPECT ALL DIM TO DIM SHEET	
		Comment: INSPECT ALL DIM TO DIM SHEET	
4.0	QC8	SECOND CHECK	
		Comment: SECOND CHECK	
5.0	HAND FINISHING1	HAND FINISHING RESOURCE #1	
		Comment: HAND FINISHING RESOURCE #1	
		Chemical Conversion Coat as per QSI 005 4.1	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: D5951 PAR #: _____ Fault Category: _____ NCR: Yes No DQA:  Date: 08-11-17

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR: 43246		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			
08/11/09	2.0	1 part, the flange thickness too small of .030" R.C. the tool come out from the holder.	GP 08.11.10 PR Q51042	Margins still positive. SEE ATTACHED SR. Acceptable	 08/11/17	GP 08/11/16	08.11.10 PR Q51042	 08/11/17

NOTE: Date & initial all entries

Date: Thursday, 06/11/2008 2:31:39 PM
User: Julie Dawson

Process Sheet

Customer: CU-DAR001 Dart Helicopters Services

Drawing Name: OUTER FWD SADDLE

Job Number: 43246

Part Number: D5951

Job Number:



Seq. #: Machine Or Operation:

Description :

6.0 POWDER COATING

POWDER COATING



M109152



9x

Comment: POWDER COATING

Powder Coat White Gloss (Ref: 4.3.5.1) as per QSI 005 4.3

START TIME: 1:45

OVEN TEMPERATURE: 320

FINISH TIME: 2:15

MF 08/11/17

7.0 QC3

INSPECT POWDER COAT/CHEMICAL CONVERSION



Comment: INSPECT POWDER COAT/CHEMICAL CONVERSION

08-11-17

9a

8.0 PACKAGING 1

PACKAGING RESOURCE #1



Comment: PACKAGING RESOURCE #1

Identify and Stock

Location:

ST430

18 08/11/18 (X9)

08/11/18 AJ

Comment: FINAL INSPECTION/W/O RELEASE

Job Completion



MF 08-11-18

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: _____ PAR #: _____ Fault Category: _____ NCR: Yes No DQA: _____ Date: _____

Resolution: _____ Disposition: _____ QA: N/C Closed: _____ Date: _____

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

DART AEROSPACE LTD	Work Order:	4324(p)
Description: Outer Fwd Saddle	Part Number:	D5951
Inspection Dwg: D5951	Rev: B	Page 1 of 1

Inspect dimensions highlighted on inspection sheet drawing and record below:

				Recorded Actual Dimensions						
Dim	Min	Max	Go/No Go Gauge	1	2	3	4	By	Date	
A	0.437	0.444		.440	.440	.440	.440			
B	1.745	1.755		1.750	1.750	1.750	1.750			
C	5.245	5.255		5.250	5.250	5.250	5.250			
D	6.995	7.005		7.000	7.000	7.000	7.000			
E	5.240	5.260		5.247	5.250	5.249	5.249			
F	4.745	4.755		4.746	4.746	4.749	4.746			
G	0.315	0.322		.321	.321	.321	.321			
H	1.522	1.532		1.527	1.526	1.524	1.525			
I	3.048	3.058		3.055	3.054	3.052	3.052			
J	4.575	4.585		4.580	4.586	4.579	4.579			
K	0.315	0.322		.316	.321	.321	.321			
L	0.495	0.505		.497	.497	.498	.498			
M	0.490	0.510		.498	.498	.497	.498			
N	1.615	1.635		1.627	1.630	1.627	1.631			
O	7.990	8.010		8.000	8.000	8.000	8.000			
P	2.240	2.260		2.252	2.251	2.253	2.249			
Q	0.307	0.312		.310	.310	.310	.310			
R	0.760	0.765		.760	.760	.760	.760			
S	0.490	0.510		.500	.502	.502	.502			
T	1.375	1.395		1.381	1.380	1.381	1.381			
U	2.000	2.020		2.002	2.001	2.003	2.003			
V										
W										
X										
Y										
Z										
AA										
AB										
AC										
AD										
AE										
AF										
AG										
AH										
Accept/Reject										

Measured by:	One	Audited by:	SP
Date:	08/11/09	Date:	08/11/16

Rev	Date	Change	Revised by	Approved
A	99.04.19	New Issue	RF	
B	02.12.13	Reformat; Added Dim. T-U & DT8682, DT8686	KJ/RF	
C	06.12.06	Dimensions A,G,K,L,N,P revised	KJ/EC	
D	07.06.15	Dimension G revised	KJ/JLM	
E	08.04.21	Dimension E revised	KJ/DD	

DART AEROSPACE LTD	Work Order:	513246
Description: Outer Fwd Saddle	Part Number:	D5951
Inspection Dwg: D5951	Rev: B	Page 1 of 1

Inspect dimensions highlighted on inspection sheet drawing and record below:

Dim	Min	Max	Go/No Go Gauge	Recorded Actual Dimensions				By	Date
				15	16	17	18		
A	0.437	0.444		.440	.440	.440	.440		
B	1.745	1.755		1.750	1.750	1.750	1.750		
C	5.245	5.255		5.250	5.250	5.250	5.250		
D	6.995	7.005		7.000	7.000	7.000	7.000		
E	5.240	5.260		5.250	5.250	5.248	5.248		
F	4.745	4.755		4.745	4.748	4.748	4.746		
G	0.315	0.322		.321	.321	.321	.321		
H	1.522	1.532		1.527	1.524	1.525	1.527		
I	3.048	3.058		3.050	3.057	3.052	3.054		
J	4.575	4.585		4.580	4.580	4.579	4.580		
K	0.315	0.322		.321	.321	.321	.321		
L	0.495	0.505		.498	.498	.498	.499		
M	0.490	0.510		.497	.493	.492	.496		
N	1.615	1.635		1.630	1.630	1.630	1.629		
O	7.990	8.010		8.000	8.000	8.000	8.000		
P	2.240	2.260		2.248	2.248	2.251	2.249		
Q	0.307	0.312		.310	.310	.310	.310		
R	0.760	0.765		.760	.760	.760	.760		
S	0.490	0.510		.503	.503	.504	.502		
T	1.375	1.395		1.380	1.377	1.383	1.385		
U	2.000	2.020		2.002	2.001	2.005	2.007		
V									
W									
X									
Y									
Z									
AA									
AB									
AC									
AD									
AE									
AF									
AG									
AH									
Accept/Reject									

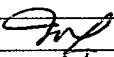
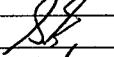
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Date:	08/11/09	Date:	08/11/16

Rev	Date	Change	Revised by	Approved
A	99.04.19	New Issue	RF	
B	02.12.13	Reformat; Added Dim. T-U & DT8682, DT8686	KJ/RF	
C	06.12.06	Dimensions A,G,K,L,N,P revised	KJ/EC	
D	07.06.15	Dimension G revised	KJ/JLM	
E	08.04.21	Dimension E revised	KJ/DD	<i>DD</i>

DART AEROSPACE LTD	Work Order:	43246
Description: Outer Fwd Saddle	Part Number:	D5951
Inspection Dwg: D5951	Rev: B	Page 1 of 1

Inspect dimensions highlighted on inspection sheet drawing and record below:

				Recorded Actual Dimensions					
Dim	Min	Max	Go/No Go Gauge	1	2	3	4	By	Date
A	0.437	0.444		.440					
B	1.745	1.755		1.750					
C	5.245	5.255		5.256					
D	6.995	7.005		7.000					
E	5.240	5.260		5.250					
F	4.745	4.755		4.748					
G	0.315	0.322		.321					
H	1.522	1.532		1.528					
I	3.048	3.058		3.054					
J	4.575	4.585		4.579					
K	0.315	0.322		.321					
L	0.495	0.505		.499					
M	0.490	0.510		.469	←				
N	1.615	1.635		1.629					
O	7.990	8.010		7.999					
P	2.240	2.260		2.245					
Q	0.307	0.312		.310					
R	0.760	0.765		.760					
S	0.490	0.510		.501					
T	1.375	1.395		1.379					
U	2.000	2.020		2.005					
V									
W									
X									
Y									
Z									
AA									
AB									
AC									
AD									
AE									
AF									
AG									
AH									
Accept/Reject									

Measured by:		Audited by:	
Date:	08/11/10	Date:	08/10/16

Rev	Date	Change	Revised by	Approved
A	99.04.19	New Issue	RF	
B	02.12.13	Reformat; Added Dim. T-U & DT8682, DT8686	KJ/RF	
C	06.12.06	Dimensions A,G,K,L,N,P revised	KJ/EC	
D	07.06.15	Dimension G revised	KJ/JLM	
E	08.04.21	Dimension E revised	KJ/DD	

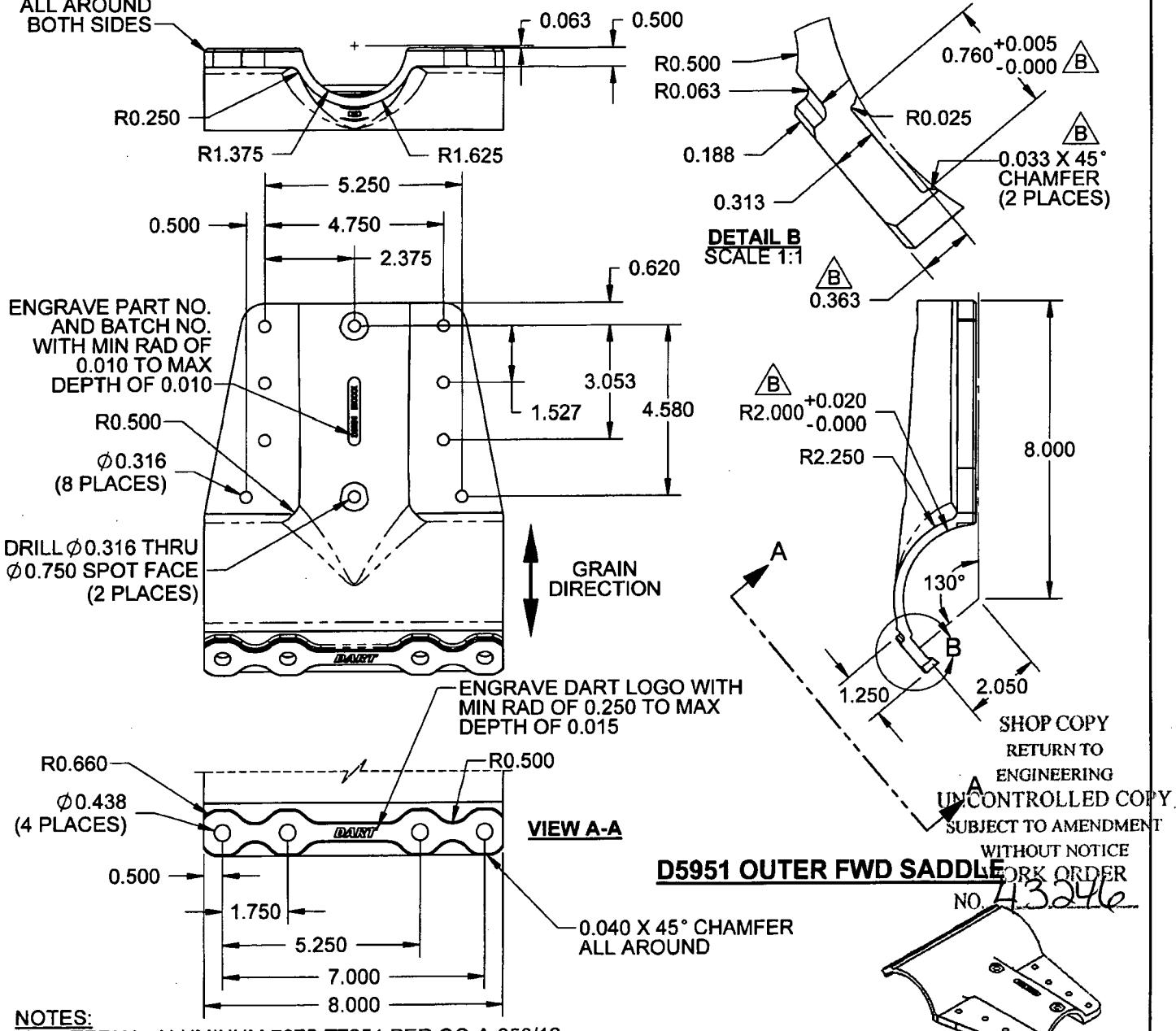
DART

DESIGN BW	DRAWN BY CB	DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA	
CHECKED <i>CE</i>	APPROVED <i>CH</i>	DRAWING NO. D5951	REV. B SHEET 1 OF 1
DATE 06.11.07		TITLE OUTER FWD SADDLE	SCALE 1:4

RELEASED

06.11.28 #

CHAMFER
0.075 X 45°
ALL AROUND
BOTH SIDES



NOTES:

- 1) MATERIAL: ALUMINUM 7075-T7351 PER QQ-A-250/12
(MAKE FROM D6101-013 SADDLE BILLET, 7075)
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
POWDER COAT GLOSS WHITE (4.3.5.1) PER DART QSI 005 4.3
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED
- 4) ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED
- 5) BREAK ALL SHARP EDGES 0.010 TO 0.020

ISOMETRIC VIEW

SCALE 1:8

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Excerpt from
SR-DZUS-594-1

CP 08.11.10

5.0 Saddle Attachment Analysis

5.1 Saddle Attachment Geometry

Figure 1 in Reference 1 illustrates the geometry and co-ordinate system of the saddles and skidtube.

$L_{sad} := 8 \cdot \text{in}$	Saddle length
$t_{over} := 0.250 \cdot \text{in}$	Saddle overhang thickness
$D_f := 0.438 \cdot \text{in}$	Saddle flange bolt holes, diameter
$t_f := 0.313 \cdot \text{in}$	Saddle flange thickness
$w_f := 0.75 \cdot \text{in}$	Skidtube flange thickness
$e_f := 0.281 \cdot \text{in}$	Saddle flange edge distance
$D_x := 0.313 \cdot \text{in}$	Saddle-to-crosstube bolt holes, diameter
$e_x := 0.464 \cdot \text{in}$	Saddle edge distance near saddle-to-crosstube bolt holes
$t_r := 0.250 \cdot \text{in}$	Saddle thickness at saddle-to-crosstube interface
$t_{mat} := 0.470 \cdot \text{in}$ <i>(was 0.500)</i>	Saddle thickness at AN5 attachment flanges
$c_{tube} := 1.375 \cdot \text{in}$	Crosstube radius at cuff (portion in saddle)
$h_f := 6 \cdot \text{in}$	Crosstube bore height (portion in saddle)
$t_c := 0.375 \cdot \text{in}$	Thickness of crosstube wall
$c_y := 2.00 \cdot \text{in}$	Skidtube, vertical radius
$c_z := 2.05 \cdot \text{in}$	Skidtube, horizontal radius
$wall := 0.100 \cdot \text{in}$	Skidtube wall thickness
$ts := cz - cy + wall$	Skidtube minimum wall thickness at the location ridge
$nt := 8$	Number of skidtube bolt shear areas
$ns := 4$	Number of saddle quadrants
$nc := 4$	Number of crosstube bolt shear areas
$nf := 4$	Number of flange bolts each side of crosstube

5.2 Maximum Forces and Moments

In comparing the D5951/D5953/D5955/D5957 saddles used in D205-594-011 vs the D2571/D2572/D2573/D2574 saddles used in D205-634-011 (existing high gear skidtube approved per TC STC SH96-88 and FAA STC SR00563NY), the D5951/D5953/D5955/D5957 saddles have been significantly reinforced for the larger overturning moments. Because the D205-594-011 landing gear is softer than existing high-gears (such as the Dart D212-664-101-201 crosstubes approved per TC STC SH01-9 and FAA STC SR01298NY), all other saddle loads generated by crosstube stiffness are less than for existing high-gear crosstubes (as verified by deflection testing per TP-D205-594-2). Therefore, this analysis determines whether the D5951/D5953/D5955/D5957 saddles are capable of sustaining the larger overturning moment created by FAR 29.501(c) and FAR 29.501(f1). To be conservative, the moment arms used in these calculations correspond to the undeflected heights of the crosstubes.

$$M_f := (0.223 \cdot 2.92 \cdot 1722 \cdot \text{lb}) \cdot (42.00 \cdot \text{in}) \quad M_f = 47094 \cdot \text{lb} \cdot \text{in} \quad \text{FAR 29.501(c) @ Forward Saddle}$$

$$M_a := (0.223 \cdot 2.37 \cdot 3915 \cdot \text{lb}) \cdot (40.00 \cdot \text{in}) \quad M_a = 82765 \cdot \text{lb} \cdot \text{in} \quad \text{FAR 29.501(c) @ Aft Saddle}$$

$GW := 11200 \cdot \text{lb}$ Gross weight of 212, which is most critical in Bell 204/205/212 series

$$F_{zsad} := \frac{1}{2} \cdot 1.33 \cdot GW \cdot \cos(45 \cdot \text{deg}) \quad F_{zsad} = 5267 \cdot \text{lb} \quad \text{FAR 29.501(f1) Vertical Load}$$

$$F_{xsad} := \frac{1}{2} \cdot 1.33 \cdot GW \cdot \sin(45 \cdot \text{deg}) \quad F_{xsad} = 5267 \cdot \text{lb} \quad \text{FAR 29.501(f1) Fwd Load}$$

$$M_{ysad} := F_{xsad} \cdot 42.00 \cdot \text{in} - F_{zsad} \cdot 4 \cdot \text{in} \quad M_{ysad} = 200128 \cdot \text{lb} \cdot \text{in} \quad \text{FAR 29.501(f1) @ Fwd Saddle}$$

Most Critical

Saddle Material Strength

This calculation checks the strength of the saddle material through the critical cross section illustrated in Figure 4 of Reference 1. The estimates for the inertia values and the area of this cross section are also shown in the Reference section.

$$Lf := \frac{L_{sad}}{2} - c_{tube}$$

$$Lf = 2.63 \text{ in}$$

Flange length

$$CG_x := c_{tube} + 0.5 \cdot L_f$$

$$CG_x = 2.69 \text{ in}$$

Center of Gravity of flange

$$I_x := \frac{\pi}{4} \left[(c_{tube} + t_r)^4 - c_{tube}^4 \right] + 4 \cdot \left(\frac{1}{12} \cdot t_{mat} \cdot L_f^3 + t_{mat} \cdot L_f \cdot CG_x^2 \right)$$

$$I_x = 41.15 \text{ in}^4$$

$$A := \pi \cdot [(c_{tube} + t_r)^2 - c_{tube}^2] + 4 \cdot t_{mat} \cdot L_f$$

$$A = 7.29 \text{ in}^2$$

a) Stress due to M_{ysad} and F_{zsad}

$$\sigma_z := \frac{M_{ysad} \cdot L_{sad}}{2 \cdot I_x} + \frac{F_{zsad}}{A} \quad \sigma_z = 20177.4 \text{ lb} \cdot \text{in}^{-2}$$

Stress due to M_{ysad} and F_{zsad}

$$MS5a := \frac{F_{cy3}}{\sigma_z} - 1$$

$$MS5a = 1.68$$

Margin of Safety

b) Shear Stress due to F_{xsad}

$$\tau_{xy} := \frac{F_{xsad}}{A} \quad \tau_{xy} = 722.31 \text{ lb} \cdot \text{in}^{-2}$$

Shear stress

$$MS5b := \frac{F_{su3}}{\tau_{xy}} - 1$$

$$MS5b = 54.38$$

Margin of Safety

5.4 Margin of Safety Summary

MS1a = 0.99 Shear strength of saddle ridge, ultimate

MS1b = 2.49 Shear strength of saddle ridge, yield

MS2a = 12.09 Saddle-to-skidtube bolt strength

MS2b = 18.37 Saddle-to-skidtube bearing on saddle

MS2c = 9.69 Saddle-to-skidtube shear tear-out

MS2d = 7.18 Saddle-to-skidtube bearing on skidtube

MS3a = 2.09 Saddle-to-crosstube bolt strength

MS3b = 2.91 Saddle-to-crosstube bearing on saddle

MS3c = 3.98 Saddle-to-crosstube shear tear-out

MS3d = 4.80 Saddle-to-crosstube bearing on crosstube

MS4 = 0.93 Saddle splitting

MS5a = 1.68 Saddle stress due to Myrot and Fzrot

MS5b = 54.38 Saddle shear stress

6.0 Conclusion

All margins are positive, therefore the saddle attachment for the D205-594-011 Extended Height Landing Gear meet the loading requirements of FAR 29.471/473/501/571. The drop weight for TP-D205-594-1 will be increased to 6320 lb, to account for the damage tolerance of ICA-D205-594 and the requirements of FAR 29.501(d2). The fatigue life of the crosstubes is sufficiently long to allow for an "on condition" replacement criteria in ICA-D205-594.

CP
08.11.10

5.0 Saddle Attachment Analysis

5.1 Saddle Attachment Geometry

Figure 1 in Reference 1 illustrates the geometry and co-ordinate system of the saddles and skidtube.

$L_{sad} := 8 \cdot \text{in}$	Saddle length
$t_{over} := 0.250 \cdot \text{in}$	Saddle overhang thickness
$D_f := 0.438 \cdot \text{in}$	Saddle flange bolt holes, diameter
$t_f := 0.313 \cdot \text{in}$	Saddle flange thickness
$w_f := 0.75 \cdot \text{in}$	Skidtube flange thickness
$e_f := 0.281 \cdot \text{in}$	Saddle flange edge distance
$D_x := 0.313 \cdot \text{in}$	Saddle-to-crosstube bolt holes, diameter
$e_x := 0.464 \cdot \text{in}$	Saddle edge distance near saddle-to-crosstube bolt holes
$t_r := 0.250 \cdot \text{in}$	Saddle thickness at saddle-to-crosstube interface
$t_{mat} \text{ (0.470 in) WAS } 0.500$	Saddle thickness at AN5 attachment flanges
$c_{tube} := 1.375 \cdot \text{in}$	Crosstube radius at cuff (portion in saddle)
$h_f := 6 \cdot \text{in}$	Crosstube bore height (portion in saddle)
$t_c := 0.375 \cdot \text{in}$	Thickness of crosstube wall
$c_y := 2.00 \cdot \text{in}$	Skidtube, vertical radius
$c_z := 2.05 \cdot \text{in}$	Skidtube, horizontal radius
$w_{all} := 0.100 \cdot \text{in}$	Skidtube wall thickness
$t_s := c_z - c_y + w_{all}$	Skidtube minimum wall thickness at the location ridge
$n_t := 8$	Number of skidtube bolt shear areas
$n_s := 4$	Number of saddle quadrants
$n_c := 4$	Number of crosstube bolt shear areas
$n_f := 4$	Number of flange bolts each side of crosstube

5.2 Maximum Forces and Moments

In comparing the D5951/D5953/D5955/D5957 saddles used in D205-594-013/-023 vs the D2571/D2572/D2573/D2574 saddles used in D205-634-011 (existing low gear skidtube approved per TC STC SH96-88 and FAA STC SR00563NY), the D5951/D5953/D5955/D5957 saddles have been significantly reinforced for the larger overturning moments. Because the D205-594-013/-023 landing gear is softer than existing Bell low gear, all other saddle loads generated by crosstube stiffness are less than for existing high-gear crosstubes (as verified by deflection testing per TP-D205-594-5). Therefore, this analysis determines whether the D5951/D5953/D5955/D5957 saddles are capable of sustaining the larger overturning moment created by FAR 29.501(c) and FAR 29.501(f1). To be conservative, the moment arms used in these calculations correspond to the undeflected heights of the crosstubes.

$$M_f := (0.223 \cdot 3.20 \cdot 1855 \cdot \text{lb}) \cdot (36.100 \cdot \text{in}) M_f = 47787 \cdot \text{lb}\cdot\text{in} \quad \text{FAR 29.501(c) @ Forward Saddle}$$

$$M_a := (0.223 \cdot 2.43 \cdot 4405 \cdot \text{lb}) \cdot (33.40 \cdot \text{in}) M_a = 79727 \cdot \text{lb}\cdot\text{in} \quad \text{FAR 29.501(c) @ Aft Saddle}$$

$$G_W := 11200 \cdot \text{lb} \quad \text{Gross weight of 212, which is most critical in Bell 204/205/212 series}$$

$$F_{zsad} := \frac{1}{2} \cdot 1.33 \cdot G_W \cdot \cos(45 \cdot \text{deg}) \quad F_{zsad} = 5267 \cdot \text{lb} \quad \text{FAR 29.501(f1) Vertical Load}$$

$$F_{xsad} := \frac{1}{2} \cdot 1.33 \cdot G_W \cdot \sin(45 \cdot \text{deg}) \quad F_{xsad} = 5267 \cdot \text{lb} \quad \text{FAR 29.501(f1) Fwd Load}$$

$$M_{ysad} := F_{xsad} \cdot 36.10 \cdot \text{in} - F_{zsad} \cdot 4 \cdot \text{in} \quad M_{ysad} = 169056 \cdot \text{lb}\cdot\text{in} \quad \text{FAR 29.501(f1) @ Fwd Saddle
Most Critical}$$

Saddle Material Strength

This calculation checks the strength of the saddle material through the critical cross section illustrated in Figure 4 of Reference 1. The estimates for the inertia values and the area of this cross section are also shown in the Reference section.

$$Lf := \frac{L_{sad}}{2} - ctube$$

$$Lf = 2.63 \text{ in}$$

Flange length

$$CGx := ctube + 0.5 \cdot Lf$$

$$CGx = 2.69 \text{ in}$$

Center of Gravity of flange

$$Ix := \frac{\pi}{4} \left[(ctube + tr)^4 - ctube^4 \right] + 4 \cdot \left(\frac{1}{12} \cdot tmat \cdot Lf^3 + tmat \cdot Lf \cdot CGx^2 \right)$$

$$Ix = 41.15 \text{ in}^4$$

$$A := \pi \cdot [(ctube + tr)^2 - ctube^2] + 4 \cdot tmat \cdot Lf$$

$$A = 7.29 \text{ in}^2$$

a) Stress due to Mysad and Fzsad

$$\sigma_z := \frac{Mysad \cdot L_{sad}}{2 \cdot Ix} + \frac{Fzsad}{A} \quad \sigma_z = 17156.74 \text{ lb-in}^{-2}$$

Stress due to Mysad and Fzsad

$$MS5a := \frac{Fcy3}{\sigma_z} - 1$$

$$MS5a = 2.15$$

Margin of Safety

b) Shear Stress due to Fxsad

$$\tau_{xy} := \frac{Fxsad}{A} \quad \tau_{xy} = 722.31 \text{ lb-in}^{-2}$$

Shear stress

$$MS5b := \frac{Fsu3}{\tau_{xy}} - 1$$

$$MS5b = 54.38$$

Margin of Safety

5.4 Margin of Safety Summary

MS1a = 1.33 Shear strength of saddle ridge, ultimate

MS1b = 3.09 Shear strength of saddle ridge, yield

MS2a = 12.09 Saddle-to-skidtube bolt strength

MS2b = 18.37 Saddle-to-skidtube bearing on saddle

MS2c = 9.69 Saddle-to-skidtube shear tear-out

MS2d = 7.18 Saddle-to-skidtube bearing on skidtube

MS3a = 2.09 Saddle-to-crosstube bolt strength

MS3b = 2.91 Saddle-to-crosstube bearing on saddle

MS3c = 3.98 Saddle-to-crosstube shear tear-out

MS3d = 4.80 Saddle-to-crosstube bearing on crosstube

MS4 = 1.28 Saddle splitting

MS5a = 2.15 Saddle stress due to Myrot and Fzrot

MS5b = 54.38 Saddle shear stress

6.0 Conclusion

All margins are positive, therefore the saddle attachment for the D205-594-013/-023 Extended Height Landing Gear meet the loading requirements of FAR 29.471/473/501/571. The drop weight for TP-D205-594-4 will be increased to 7036 lb, to account for the damage tolerance of ICA-D205-594 and the requirements of FAR 29.501(d2). The fatigue life of the crosstubes is sufficiently long to allow for an "on condition" replacement criteria in ICA-D205-594.